Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Guidelines for Evaluating the	)	ET Docket No. 93-62
Environmental Effects of	)	
Radio frequency Radiation	)	

COMMENTS OF APPLE COMPUTER, INC.

Apple Computer, Inc. ("Apple") hereby submits its comments in response to the Federal Communications Commission's (the "Commission") Notice of Proposed Rulemaking ("NPRM") in the above-referenced proceeding.[1]

In the NPRM, the Commission proposed to amend and update the guidelines and methods used for evaluating the environmental effects of radio frequency ("RF") radiation from FCC-regulated facilities. Specifically, it proposed to use the new standard for RF exposure (the "1992 ANSI/IEEE Standard") developed by the American National Standards Institute ("ANSI") in association with the Institute of Electrical and Electronic Engineers, Inc. (the "IEEE").

The 1992 ANSI/IEEE Standard is generally more restrictive than the previous ANSI standard, which was adopted by the Commission in 1985, in terms of the permitted amount of environmental RF exposure. In addition, it applies to a wider range of frequencies than did the previous standard and specifies two sets of exposure recommendations, one for "controlled environments" (which usually involve people who are aware they may be exposed to RF energy) and another for "uncontrolled environments" (which usually involve the general public).

Apple fully supports the Commission's efforts to update its exposure limits to protect the public from any potential dangers associated with RF radiation. While evaluating the biological effects of RF radiation is "complex and controversial,"[2] it is also critically important. Indeed, when Apple first described its vision of wireless

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1 8 FCC Rcd 2840 (1993).

2 NPRM at ¶10.

computing, or "Data-PCS," it urged the Commission to adopt health and safety standards for all PCS equipment (both licensed and unlicensed PCS) "to insure and promote the intrinsic safety of products used by consumers in the work-place and in schools."[3]

With respect to this proceeding, Apple's principal focus in these comments is on the safety of computing devices that incorporate radio transmitters, particularly Data-PCS and other unlicensed devices that will be developed using the new unlicensed PCS bands,[4] the ISM bands,[5] and other frequency bands that will be made available as spectrum is reallocated to non-federal use pursuant to the Budget Reconciliation Act of 1993.

In view of its long-standing commitment to health and safety issues, Apple is pleased that the Commission adopted health and safety standards for PCS devices in both its narrowband and wideband PCS Orders.[6] The widespread consumer use of personal computers, and the expected development of PCS, underscore the importance of ensuring that data and voice PCS devices do not pose any health risk to users. To this end, Apple has worked within IEEE and the industry on the development of the 1992 ANSI Standard, and believes that the adoption of this standard, as proposed by the Commission, is in the public interest. As the Commission has noted, however, certain issues remain.[7]

I. THE COMMISSION SHOULD ENSURE THAT THE RADIATED POWER EXCLUSION LIMITS ARE DEVELOPED PROMPTLY AND IMPLEMENTED WITH ADEQUATE ADVANCE NOTICE.

As the Commission noted the PCS Second Report and Order, the ANSI/IEEE Standard's radiated power exclusions for low power devices apply only to transmitters

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3 Apple Petition for Rulemaking, "Data-PCS," RM-7618, at iii, 28-29 (filed January 28, 1991).

4 See GEN Docket 90-314 (1890-1930 MHz).

5 See §15.247 and §15.249 (902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz).

6 The Second Report and Order required PCS licensees and devices to comply with the 1993 ANSI/IEEE Standard, but stated that any changes to the Standard adopted in this docket would also apply to PCS devices. Second Report and Order, GEN Docket No. 90-314, RM-7140, RM-7175, RM-7618, 8 FCC Rcd 7700, at ¶191 and n.137 (released October 22, 1993) ("PCS Second R&O"). Petitions for Reconsideration of the Second Report and Order were filed on December 8, 1993, and one petitioning party sought clarification regarding the application of the controlled/uncontrolled standards to licensed PCS devices. Telocator Petition for Reconsideration, GEN Docket No. 90-314, at 18-19 (filed December 8, 1993).

7 See e.g. PCS Second R&O at ¶192.

operating at frequencies up to 1500 MHz.[8] The Commission has written to the IEEE to request a formal interpretation as to whether the formula used to determine the power exclusion can be extrapolated to 2200 MHz.[9] Such an extrapolation could make compliance with the ANSI/IEEE criteria less burdensome for manufacturers of low power devices; meanwhile, however, manufacturers will have to demonstrate compliance with the guidelines by determining maximum specific absorption rates ("SAR") associated with specific low power devices.[10]

The determination of the SAR for particular devices is cumbersome and could impede product development and introduction until industry has developed techniques for making appropriate measurements. The Commission, therefore, should encourage the IEEE to reach an early decision as to whether the exclusion formula contained in the IEEE/ANSI Standard for low power devices in an uncontrolled environment can be extrapolated to the 1890-1930 MHz unlicensed PCS band. While Apple does not seek to pre-judge resolution of this question, it does note that the maximum power allowed in the unlicensed band is 312 milliwatts,[11] compared with the 328 to 333 milliwatts that would be allowed if the IEEE/ANSI criteria were extrapolated.

In addition, Apple encourages the Commission to work with the IEEE to establish suitable exclusion power limits for all low-power devices operating in uncontrolled environments using frequencies up to 6 GHz. While most unlicensed computing devices will be deployed in the 1890-1930 MHz band as soon as the band is available, other frequency bands — most notably the ISM band, government spectrum under 5 GHz, and spectrum in the 5-6 GHz range – may be used for product development and, eventually, as additional bands for product deployment.[12] If there is

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8 Id.

9 Id.

10 Id.

11 See id. at §15.319(c) (maximum power of 312 milliwatts for a 10 MHz wide signal in the asynchronous portion of the band.) The emission limits, however, require attenuation such that the envelope of the widest signal, and therefore the allowed power, would be somewhat less. Most unlicensed devices will be limited to still lower powers, in proportion to the square root of their bandwidth.

12 For example, while interference constraints limit the usefulness of the ISM bands as an appropriate long-term environment for wireless computing devices, these bands are proving to be a fertile realm in which to develop new applications and new technologies, some of which may ultimately be deployed on a larger scale in the unlicensed PCS bands. Similarly, Apple notes that ETSI has designated the 5.150-5.250 GHz band for "Hiperlan," a high speed local area wireless networking function.

no alternative to SAR compliance measurements for low power devices operating in these bands, the ability of small companies to compete, and the rate of introduction of innovative products, could be seriously retarded.

With respect to the ISM bands, if the Commission adopts exclusion limits that are lower than the presently allowable one watt, it should give substantial advance notice to industry before making any such new limits effective.[13] New limits could affect the fundamental market, technical architecture, and operating characteristics of an ISM-band product or network, and thus should not be imposed without adequate notice and time for adjustment.

Finally, if the IEEE concludes that it is not appropriate to extrapolate its 450-1500 MHz rules to the 1890-1930 MHz unlicensed PCS band and to the §15.247 ISM bands, the Commission should take into account the different duty cycles for various classes of devices in setting power exclusion limits. Unlicensed isochronous PCS devices, for example, may operate continuously up to eight hours under certain conditions, while unlicensed asynchronous PCS devices can operate continuously only for ten milliseconds at a time, in the Subpart D band.[14]

II. THE COMMISSION SHOULD TREAT ALL UNLICENSED PCS DEVICES AS "UNCONTROLLED," AND SHOULD CLARIFY THE TERM "HAND-HELD."

Apple agrees that all unlicensed PCS devices authorized under Subpart D of the Commission's rules[15] should be considered to operate in an "uncontrolled" environment. The only regulatory control of these devices will be the Commission's equipment authorization process, which does not reach the uses to which consumers will put the devices. Therefore, just as in similar circumstances the Commission treats all personal computers as Class B digital devices — even when a manufacturer states that the computer will be marketed for use only in a commercial environment, the Commission should treat all unlicensed PCS devices as operating in an "uncontrolled" environment.

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13 Devices that operate in the 902-928 MHz portion of the ISM band under §15.247 are provided for in the present IEEE/ANSI criteria without extrapolation, but devices in the other bands identified in §15.247 are not.

14 15.323 (f).

15 See PCS Second R&O at §15.319.

Apple also suggests that the Commission clarify its use of the term "hand-held." This term is not defined in the 1992 ANSI/IEEE Standard, which should apply to certain devices even though they may not literally be hand-held.[16] To ensure that users of PCS devices are adequately protected, the Commission should consider all unlicensed PCS communications devices to operate in an "uncontrolled" environment, whether they are hand-held, mounted on the wall, or part of, or attached to, laptop and desktop computers and peripherals (such as printers and file servers) and desktop telephony devices, routers and switching equipment.[17]

III. THE RF STANDARDS SHOULD BE APPLIED FAIRLY TO ALL DEVICES, INCLUDING LICENSED PCS DEVICES.

Although these comments have focused on the application of the proposed ANSI/IEEE Standard to unlicensed PCS devices, it is obvious that the health effects of RF exposure do not depend upon the regulatory regime under which the RF emitters operate. Accordingly, as Apple discussed in its original Data-PCS Petition, licensed PCS and other personal communications devices should be treated equally, and appropriate health and safety standards should be applied to all personal communications equipment, including voice PCS equipment. As Apple has stated, "(i)t is unnecessary and unwise to apply one environmental standard to Data-PCS and a looser standard, or no standard at all, for other personal communications services."[18] The Commission should also consider possible RF radiation hazards when deciding upon the power limits for licensed PCS systems.[19]

IV. CONCLUSION.

While fine-tuning of the exclusion criteria and other clarifications of the IEEE/ANSI standards will be required, Apple encourages the Commission to continue

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[16] The ANSI/IEEE standard does not differentiate devices by how they are held or used, (except when the device has a "radiating structure maintained within 2.5 cm. of the body"); instead, it distinguishes product categories by their power. It uses the term "hand-held" only incidentally, in the discussions.

[17] Many wireless LAN and cordless telephony functions will use "access points," or base stations, to connect to wired infrastructures or the PSTN.

[18] Reply Comments of Apple Computer, Inc., RM-7618, at 16 (filed May 10, 1991).

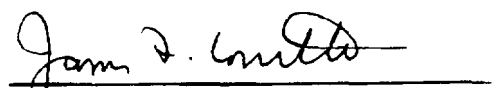
[19] Many of the Petitions for Reconsideration filed in response to the PCS Second R&O called for higher power limits for licensed PCS base stations, and several called for higher power limits for licensed mobile units. See Comments of Apple Computer, Inc., GEN Docket No. 90-314, at n.7 (filed January 3, 1994). This is a relatively recent shift of the prevailing vision of PCS, which most parties originally conceived of as employing lower power base stations and lower-power, smaller, longer-battery-life handsets compared with today's cellular.

proposed rules, with the clarifications discussed above, will represent significant progress in the vital area of health and safety.

Accordingly, Apple urges the Commission to adopt health and safety standards that will protect consumers from possible adverse effects of RF radiation, as discussed above.

Respectfully submitted,

APPLE COMPUTER, INC.



James F. Lovette
One Infinite Loop, MS: 301-4J
Cupertino, California 95014
(408) 974-1418

OF COUNSEL:

Henry Goldberg
GOLDBERG, GODLES, WIENER & WRIGHT
1229 Nineteenth Street, N.W.
Washington, D.C. 20036
(202) 429-4900

James M. Burger
Director, Government Law
APPLE COMPUTER, INC.
1550 M Street, N.W., Suite 100
Washington, D.C. 20005
(202) 872-6263

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